COURSE TITLE: Foundations of Energy

UNIT TITLE: Nonrenewable--Petroleum

SECTION 1: General Information and Overview

Grade Level: 9-12

Suggested Number of Lessons: 9-10

Suggested Time to Complete Unit: 2 weeks

Unit Overview: In this unit, students will investigate the geology, methods of extraction, processing and uses of petroleum in our world around us.

SECTION 2: Essential Questions

1.	What role does petroleum as a source of fuel play in our lives?
2.	Why is petroleum such a political and economical resource for individuals?
3.	How is our use of petroleum such an important aspect of everyday life?

SECTION 3: Major Focus

Technical Content CTE Program of Studies	Learner Activities (Enabling Knowledge and Skills/Processes)	Core Content For Assessment	Academic Expectations
Construction Technology KOSSA Standard AD-002: Demonstrate the ability to learn new processes and steps. **2.1--**Assess the impact of various current and new technologies on the economy.	**Research** the political and economic impact of the petroleum industry and its effect on gas pricing. **Using** a web search engine **find** high low and average gas pricing in Kentucky and the nation. Using the PDF files in the Petroleum unit, **research** current and new policies in the energy industry for understandings of current energy trends, the impact on our nation's energy portfolio and economy at both the state and national level.	**SC-HS-4.6.7** Students will: • explain real world applications of energy using information/data; • evaluate explanations of mechanical systems using current scientific knowledge about energy. The universe become less orderly and less organized over time. Thus, the overall effect is that the energy is spread out uniformly. For example, in the operation	**2.18** Students understand economic principles and are able to make economic decisions that have consequences in daily living. **2.1** Students understand scientific ways of thinking and working and use those methods to solve real-life problems.

		of mechanical systems, the useful energy output is always less than the energy input; the difference appears as heat. **DOK 2**	
Construction Technology KOSSA Standard AD-003: Implement new processes given oral instructions. **2.1-2.3--**Engaging in meaningful hands-on, minds-on conceptual based activities in the areas of petroleum energy technologies.	**Identify** new technologies being used or researched by the petroleum industry (e.g., via YouTube videos). **Identify** new or emerging petroleum technologies researched regarding petroleum energy. **Using** the *transportation debate activity*, pair and share a minimum of 2 resources identified in the video on resource CD. **Prepare** a demonstration using the activity *transportation fuels expo* or by **performing** a song from the *rock performances activity guide.*	**SC-HS-4.6.1** Students will: • explain the relationships and connections between matter, energy, living systems and the physical environment; • give examples of conservation of matter and energy. As matter and energy flow through different organizational levels (e.g., cells, organs, organisms, communities) and between living systems and the physical environment, chemical elements are recombined in different ways. Each recombination results in storage and dissipation of energy into the environment as heat. Matter and energy are conserved in each change. **DOK 3**	**1.3** Students make sense of the various things they observe. **2.2** Students identify, analyze and use patterns such as cycles and trends to understand past and present events and predict possible future events. **2.22** Students create works of art and make a presentation to convey a point of view.
Construction Technology KOSSA Standard EA-005: Display initiative. **5.4--**Students will investigate with teacher guidance the role of petroleum technology in the future. **2.6--**Demonstrate employability skills relative to the energy industry.	Using the *Fossil Fuels to Products Kit*s, **explore** the porosity and permeability exercise. **Review** energy around the world, regarding perspectives and laws. **Investigate** and **interpret** findings. **Investigate** and **develop** an oral/written report on a career in the petroleum industry using a power point	**SC-HS-4.64** Students will: • describe the components and reservoirs involved in biogeochemical cycles (water, nitrogen, carbon dioxide and oxygen); • explain the movement of matter and energy in biogeochemical cycles and related phenomena. The total energy of the universe is constant. Energy can change forms and/or be transferred in	**1.3** Students will make sense of what they observe. **2.4** Students use the concept of scale and scientific models to explain the organization and functioning of living and nonliving things and predict other characteristics that might be observed. **2.36** Students use strategies for choosing

	medium that will include educational requirements, location, and experience as well as expected salary levels in a career pathway. **Listen** to a guest speaker from the petroleum industry. *(e.g., invite a geologist or petroleum engineer to speak to class)*	many ways, but it can neither be created nor destroyed. Movement of matter between reservoirs is driven by earth's internal and external sources of energy. These movements are often accompanied by a change in physical and chemical properties of the matter. Carbon, for example, occurs in carbonate rocks such as limestone, in the atmosphere as carbon dioxide gas, in water as dissolved carbon dioxide and in all organisms as complex molecules that control the chemistry of life. **DOK 3**	and preparing for a career.
Construction Technology KOSSA Standard AC-002: Students will identify methods of planning that will save costs on time and materials.	**Research** and **define** three political and economical factors involving petroleum and the environment. **Work** in teams to **make** an oral presentation on the laws and regulations for drilling on public lands.	**SC-HS-4.69** Students will: • explain the cause and effect relationship between global climate and weather patterns and energy transfer (cloud cover, location of mountain ranges, oceans); • predict the consequences of changes to the global climate and weather patterns. Global climate is determined by energy transfer from the sun at and near earth's surface. This energy transfer is influenced by dynamic processes such as cloud cover and the earth's rotation and static conditions such as the	**2.19** Students understand and recognize the relationship between people and geography and apply their knowledge to real life situations. **5.4** Students use a decision making process to make an informed decision.

		position of mountain ranges and oceans. **DOK 3**	

SECTION 4: Culminating Project with Scoring Guide

Use the NEED fossil fuels-to-products kit and demonstrate one of the six lab activities identified in the Student Guide as the culminating project. Use the Teacher Guide and rubric for scoring.

CATEGORY	4	3	2	1
CONTENT	EXTENSIVE- CONTENT BEYOND WHAT IS TAUGHT IN CLASS	GOOD- EXPLANANTION OF CONCEPTS COVERED IN CLASS	BASIC – WHAT HAS ALREADY BEEN COVERED IN CLASS	LIMITED- DOESN'T COVER MATERIAL AS WELL AS DONE IN CLASS
TECHNOLOGY	EXTENSIVE- POWER POINT WITH EXCELLENT ANIMATION AND PICTURES	APPROPRIATE- POWER POINT HAS SOME ANIMATION AND PICTURES	BASIC- POWER POINT WITH LITTLE ANIMATION AND PICTURES	LIMITED – POWER POINT WITH NO ANIMATION OR PICTURES
PRESENTATION	EXCELLENT- FLOWS WELL, AUDIENCE VERY ATTENTIVE- WELL REHEARSED	GOOD – FLOWS WELL PARTICIPANTS KNOW MATERIAL WELL	BASIC – FLOWS UNEVENLY MAY HAVE SOME READING OF NOTES OR SLIDES	LIMITED- PARTICIPANTS READ FROM NOTES OR SLIDES
INTEREST	EXTENSIVE – PARTICIPANTS MAKE MANY EXTENSIONS AND EXPLANATIONS	APPROPRIATE – ENCOURAGES QUESTIONS AND COMMENTS	BASIC – CAN FIELD SOME QUESTIONS	LIMITED – GLAD TO BE THROUGH WITH THE PRESENTATION

SECTION 5: Assessment and Enabling Skills and Processes

Assessment:	Fossil Fuels to Products curriculum activity and kit activities.

SECTION 6: Support Materials (i.e., Resources, Technology, and Equipment)

A. Resources	NEED Secondary INFO book and Fossil Fuels to Products curriculum and kit
B. Technology	Department of Energy (US)
C. Websites (samples of many available)	Energy Information Administration, www.eia.gov; Society of Petroleum Engineers, www.spe.org
D. Equipment	FF2P Kit